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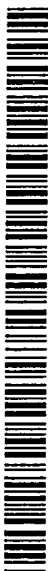


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WO 01/33400 A2

(54) Title: AUTOMATED METHODS FOR CREATION OF ADAPTIVE TRADE SPECIFICATIONS

(57) Abstract:

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Automated Methods for Creation of Adaptive Trade Specifications

Background – Cross Reference to Related Applications

This application claims the benefit of U.S. Provisional Application No. 60/163,243, filed November 3, 1999. Related subject matter is set forth in U.S. Provisional Application No. 60/161,355, filed October 26, 1999, and 60/163,245, filed November 3, 1999. The disclosures of all of the just-cited provisional applications are hereby incorporated by reference in their entireties into the present disclosure.

Background – Field of Invention

The present invention is directed to a system and method for facilitating electronic commerce and more particularly to a trade mechanism comprised of a library of predefined wizards i.e., specialized "smart" interface templates for various types of trading paradigms:

- Procurement organization
- Supplier
- Manufacturer
- Surplus Seller
- Reseller
- Simple Buyer
- Simple Seller
- Trade-in

Background – Discussion of Prior Art

Many software systems that offer direct interaction with the user provide sophisticated graphical user interfaces to facilitate information exchange between user and system. One technique for allowing a user to interact with and control a system is called a "wizard." Broadly defined, a wizard is a utility within an application that helps the user use the application to perform a particular task. For example, a "letter wizard" within a word processing application leads the user through the steps of producing different types of correspondence.

In an unrelated development, the growth of the Internet, and particularly of the World Wide Web, has led to the growth of electronic commerce, in which users buy and sell goods online. Electronic commerce, or e-commerce, can be directed at consumers or can be business-to-business ("B2B").

5 In its simplest form, e-commerce involves posting a catalog online, in which each item is described, and a fixed cost is given. Such an online catalog is typically implemented by CGI or some similar scripting language, allowing the consumer to input a quantity desired and other pertinent information through text-entry boxes, drop-down menus, buttons, and other components of a user interface.

10 Such an interface is not well suited to more complicated transactions. For example, the above-referenced patent applications teach the use of adaptive trade specifications (ATS's), in which traders specify items that they are willing to give, items that they desire to take in return, constraints on the contemplated trade, and an objective to be optimized (e.g., maximum profit or minimum total outlay). Such information can be difficult to input into a traditional e-commerce Web site.

15

Summary of the Invention

It will be readily apparent that a need exists in the art to provide a simple and efficient way to input complex trading specifications. It is, therefore, an object of the invention to provide a graphical user interface for the creation and management of Adaptive Trade Specifications for usage in the Electronic Marketplace.

20

It is a further object of invention to provide a graphical user interface to the ATS Based Match Making and Optimization automated method that can find optimal trade transaction for the traders in the Electronic Marketplace in scenarios that include, but are not limited to, business-to-business and multiple-businesses to multiple-businesses.

To achieve the above and other objects, the present invention is directed to a system and method by which traders use ATS Wizards to create and manage Adaptive Trade Specifications that are used in an ATS Based Electronic Marketplace.

This invention implements a technique by which various traders that take part in the Electronic Marketplace create and manage Adaptive Trade Specifications. An Electronic Marketplace is comprised of Electronic Malls and Electronic Auctions, or a combination of thereof. Traders will be represented in the Electronic Mall through Adaptive Trade Specifications (ATS). Given a trader's ATS created and managed by an ATS Wizard, the underlying system provides an automated process that recommends specific transactions with other traders' ATS's, that are mutually agreeable with, and optimize the objective of, the trader's ATS (e.g. minimal price, maximal profit, etc.). More specifically, the invention describes the upper tier in the infrastructure that includes Adaptive Trade Specifications (ATS), ATS-based Match Making and Optimization, and ATS-based Electronic Marketplace. These are described bellow as a summary excerpt from the related applications cited above:

- 15 • **Adaptive Trade Specification (ATS) Model.** Adaptive Trade Specification (ATS) is a formal mathematical description of trader's objective and constraints. ATS constraints include restrictions (on quantities, prices, totals, profits, revenues etc.) that must be satisfied to perform an optimal transaction, and the interconnection between various business parameters (such as profit, quantities, prices and costs). The core of each ATS is a specification of "items" the trader offers to GIVE as well as "items" to TAKE in return. For example, a procurement organization may offer to GIVE the "item" *money* and wants to TAKE items of *office supply*. An office equipment supplier may have an ATS, in which all its catalog appears as GIVE items, and money as the only TAKE item. Whereas, a manufacturer may have an ATS, in which all of its products appear as GIVE items, all raw materials and money (i.e., revenues for its products) as TAKE items. ATS is adaptive in that various numeric parameters such as quantities of items, prices, profit, revenue, totals etc. are

not fixed, but could vary, provided that they satisfy the ATS constraints. Item specifications in an ATS are also constraint-based and not fixed. For example, an ATS of a trader may include, as one of the TAKE item specifications, a hard disk that has at least 12 GB capacity and is compatible with a G7305E mother board; no exact model and vendor is necessary.

- 5 • **ATS-based Match Making (MM) Optimization Automated Method.** Given a trader's ATS, the MM and Optimization method recommends specific transactions with other traders (i.e., against their ATS's) that are mutually agreeable and optimize the objective of the trader's ATS (e.g., minimal price, maximal profit, etc.). The recommended set of transactions will indicate exactly with whom the transaction should be made, the exact GIVE and TAKE
- 10 items and their quantities, as well as other relevant parameters (e.g., price and profit). For example, for procurement ATS, the MM and Optimization method recommends a set of suppliers' ATS's and the exact quantities of the items to be purchased from each, so that the procurement ATS objective, say the minimal total cost, is achieved. Or, for a manufacturer's ATS, the MM and Optimization method can recommend a set of buyers ATS's interested in
- 15 the manufacturer's products, and a set of ATS's suppliers of raw materials necessary to manufacture the products, so that the manufacturer's objective, say maximal profit, is achieved. The ATS-based match making and optimization are generic and work uniformly regardless of a specific wizard (or trader type) that generated them.
- **ATS-based Electronic Mall.** This is a novel and powerful paradigm, which encompasses and
- 20 expands on the regular electronic mall and shop model. The main difference is that an ATS-based shop trades one or more ATS's, rather than just selling items. Thus, an ATS-based trader can sell items as a "regular" shop (i.e., have a supplier ATS), or procure (i.e., have a procurement ATS), or offer manufacturing capability (i.e., have a manufacturing ATS) etc. While a "regular" shop may be selling a long list of items, an ATS-based trader shop is likely to have only a small
- 25 number of, and often just one, ATS. For example, an office supplies shop may include its entire catalog of items in a single ATS, in which constraints will be on the limitation in available

quantities, and will also include the price function (e.g., based on price per item and volume discounts). The fact that totally unrelated items may appear in the same ATS is not a problem, because traders visiting the mall (e.g., to search, match-make etc.) will, by default, see only item sets that are relevant to their interests (ATS's). Visiting traders could perform match-making that optimizes their own ATS objective and recommends the best (combined) transaction. This can be done against ATS's in a particular shop or the entire mall. A visiting trader can immediately perform a transaction with any ATS in the mall, provided it is mutually agreeable with the visitor's ATS.

- **ATS-based Electronic Auctions.** This is a novel and powerful auction paradigm, that is especially suited for business-to-business trade, and which encompasses "regular" direct and reverse auctions as a simple case. In a regular auction, the auctioned bundle (or item) is fixed and indivisible; each bid is a monetary amount; and the outcome is a single winner who offered the highest bid. In contrast, in an ATS-based auction, the auctioned bundle is an ATS (and thus dividable among different bidders); each (partial) bid is an ATS; and the outcome may be one or many "winners", with whom the auctioning trader will perform a multiple combined transaction.

For example, suppose that a surplus seller initiates an auction with a surplus ATS, that has the objective of maximizing the overall revenue (whether the entire surplus or only part of it will be sold). Bids could be ATS-based offers from buyers (procurement organizations). Each such ATS bid may indicate, as TAKE items, only some, not all, of the surplus items, and have constraints on the quantities and prices offered (as in any ATS, it may involve flexible, rather than fixed, quantities and cost functions). When the auction ends, the system collects the latest ATS bids from all auction participants, and performs a match-making that optimizes the objective of the auctioned ATS (the maximal overall revenue, in our example). The outcome of the auction is a set of "winning" ATS's and the exact recommended quantities (quantities of

items in the surplus to be sold to each “winner” so that the maximal overall revenue will be received).

In the special case when an auctioned ATS indicates fixed quantities for traded items, and requests that there be only one winner, the ATS auction degenerates to a regular auction.

5 However, regular auctions are not flexible enough for corporate traders. For example, running a regular auction for the entire surplus would eliminate potential auction participants and possibly higher monetary awards. One could also split the surplus into small bundles, or even individual items, and run a regular auction for each bundle. However, this approach would require to run possibly hundreds of tiny auctions – a tedious process just for one surplus package.

10 Also, many corporate auction traders may not at all be willing to participate in tiny-scale auctions, which again would eliminate potential participants. In contrast, ATS auctions provides the best of both worlds: a single auction, no restrictions on potential participants, and the optimal outcome for the auction initiator (ATS).

The ATS auction is generic for any auctioned ATS and bid ATS's, regardless of how (or using which wizard) they were generated. Thus, one could also auction a procurement ATS, in which

15 case suppliers and manufacturers may be potential bidders. Or, one could auction a manufacturing ATS, in which case procurement organizations as well as raw material suppliers may be potential bidders. Thus, in addition to its flexibility, ATS auctions capture “direct”, “reverse”, and any “in-between” auctioning, depending on the ATS being auctioned.

20 All the activities and concepts described above are materialized and instantiated through specific graphical interfaces, called ATS Wizards.

The invention is directed to the process by which various traders interact with an ATS based Electronic Marketplace and to the method to create and manage ATS's. The trader using the wizard inserts into the wizard predefined trading parameters and concepts such as:

- 25
- Items to be traded.
 - Minimum and maximum quantity per each item

- Minimum and maximum price per unit of item
 - Minimum and maximum total price per item
 - Minimum and maximum total price for the entire set of items
 - Volume discount function for each item in the ATS or for the entire ATS
- 5 • Delivery dates
- Revenue
 - Profit

In each one of the wizards, *take item entries* (desired items) and *give item entries* (offered items) are constructed by adding items to the wizard by the user.

- 10 The wizards can be characterized by indicating Input, Default Input, Output, and the Method for constructing Output from Input.

The underlying system that interacts with the wizards takes the information entered by the user translates it to a mathematical format and propagates it for further processing by ATS-based Match Making Optimization Methods.

15 ***Brief Description of the Drawings***

A preferred embodiment of the present invention will be set forth in detail with reference to the drawings, in which:

FIG. 1 *ATS-Based Trading Software System*, describes a high level graphical summary of the suite of software tools related to the ATS-Based Trading Software System.

- 20 **FIG. 2** *ATS-Based Match-Making and Optimization Hardware Architecture Diagram*, describes a high level graphical summary of the hardware architecture.

FIG. 3 *Item Specification and Adaptive Trade Specification (ATS) Class Diagram*, presents a high level graphical summary of the Item Specification and Adaptive Trade Specification classes.

- FIG. 4a** *Functional Diagram for ATS Wizards, Procurement Wizard Method* presents a high
25 level graphical summary of ATS Procurement Wizard.

FIG. 4b *Functional Diagram for ATS Wizards, Supplier Wizard Method* presents a high level graphical summary of ATS Supplier Wizard.

FIG. 4c *Functional Diagram for ATS Wizards, Manufacturer Wizard Method* presents a high level graphical summary of ATS Manufacturer Wizard.

5 **FIG. 4d** *Functional Diagram for ATS Wizards, Surplus Seller Wizard Method* presents a high level graphical summary of ATS Surplus Seller Wizard.

FIG. 4e *Functional Diagram for ATS Wizards, Reseller Wizard Method* presents a high level graphical summary of ATS Reseller Wizard.

FIG. 4f *Functional Diagram for ATS Wizards, Simple Buy Wizard Method* presents a high level
10 graphical summary of ATS Simple Buy Wizard.

FIG. 4g *Functional Diagram for ATS Wizards, Simple Sell Wizard Method* presents a high level graphical summary of ATS Simple Sell Wizard.

FIG. 4h *Functional Diagram for ATS Wizards, Trade-in Wizard Method* presents a high level graphical summary of ATS Trade-in Wizard.

15 **FIG. 5** *ATS Creation Technique* presents a flow chart of the technique for forming an ATS in accordance with the functional diagram of any of FIGS. 4a-4h.

Detailed Description of the Preferred Embodiment

A preferred embodiment of the present invention will now be set forth in detail with reference to the drawings.

20 Fig. 1 shows an overview of an environment in which the wizards of the preferred embodiment can be used. An ATS-based electronic marketplace 101 can include one or more of an ATS-based electronic mall 103, an ATS-based electronic auction (forward or reverse) 105, and any other ATS-based commerce environment. As noted above, participants in the marketplace 101 form ATS's through various techniques. One such technique is the use of wizards 107, including
25 one or more of a procurement wizard 109, a supplier wizard 111, a manufacturing wizard 113,

a surplus seller wizard 115, a reseller wizard 117, a generic buy and sell wizard 119, a generic buy wizard 121, a generic sell wizard 123, a trade-in wizard 125, and other wizards adapted to specific purposes. These wizards, like those wizards that are known in the programming art, are utilities that guide a user through a specific task.

5 The ATS's formed through use of the wizards 107 are input to the ATS match-maker 127, which uses matchmaking optimization methods described in the above-referenced related applications.

 The processes performed by the matchmaker 127 are object-oriented and follow the specifications of the ODMG (Object Database Management Group). A Constraint Object
10 Oriented Database (CSPACE) 129 uses an iterative query language (IQL) 131 and a constraint and optimization library 133 to perform the matchmaking and optimization. The CSPACE 129 communicates through an ODMG wrapper 135 with an ODMG-compliant database manager 137 and also communicates directly with a mixed integer programming (MIP) solver 139.

 The above is implemented on a hardware architecture that will now be explained with reference
15 to Fig. 2. The hardware architecture capable of running an ATS based match-making and optimization system includes several logical tiers, each one performing specific computational tasks. Each tier can be described in terms of specific tasks that it performs. From the hardware perspective, each tier can be built from computers having sufficient computational power.

 Tier 1 includes a database server 201, which is a power server machine (preferably dual
20 or quad Pentium III machine) running one of the following network operating systems: Windows NT 4.0, Novell 5.0, UNIX. The database server 201 performs all tasks related to data persistency, data integrity and querying. The database server 201 runs one of the commercially available object oriented databases such as Poet, Objectivity, Object Store, etc.

 Tier 2 includes the application server 203, which is a power server machine (preferably
25 dual or quad Pentium III machine) running one of the following network operating systems: Windows NT 4.0, Novell 5.0, UNIX etc. The application server 203 performs all tasks related

to performing ATS-based match-making and optimization. The data are passed between layers via RMI, CORBA, DCOM or any other distributed computing protocol allowing remote method invocation and data transmission.

Tier 3 includes a Web server 205, which is a computer that responds to requests from Web browsers via HTTP. The Web server 205 transfers text files and corresponding graphics and data via HTTP to remote computers that are running Web browsers. The Web server 205 should have the functionality commonly associated with e-commerce Web servers, such as CGI (Common Gateway Interface) for performing searches and other dynamic HTML functions and SSL (Secure Socket Layer) for handling secure transactions.

The servers 201, 203, and 205 communicate with another through an internal network. However, in order to be useful to users, the Web server 205 communicates via the Internet 207 or another publicly accessible network with Tier 4, which includes computers 209 running on users' premises and used as Web clients. The Web clients 209 are computers or other devices (such as WAP-enabled wireless devices) capable of running any standard off-the-shelf browser. The clients 209 run Web-based applications that will use information provided by the application server 203 and the Web server 205. The servers can be, but are not necessarily, implemented on separate machines. Other possibilities are separate virtual machines or simply separate software processes or threads.

FIG. 3 provides a high level graphical description of the classes Item Specification and Adaptive Trade Specification. An ATS class 301 includes four components: give-item-entries 303, take-item-entries 305, constraints 307 and an objective 309. The give-item-entries 303 identify what the particular user is willing to give in the trade and include one or more item specifications 311. The take-item-entries 305 identify what the user wants in return and include one or more item specifications 313. The constraints 307 set forth restrictions that must be satisfied before a transaction can be carried out, e.g., constraints on quantity or on time of

delivery. The objective 309 indicates what the particular user wants to optimize; for example, a seller may want to optimize (maximize) profit, while a buyer may want to optimize (minimize) total cost.

The ATS's are created by users through ATS wizards, which will now be described.

5 Each ATS Wizard is described below, as a *Method* that takes its *Input* from the user, and creates an *Output* ATS with an *Objective* function. The *Input* section of each wizard describes fields entered by the user, and the *Method* describes the process of creation of the ATS. The use of the ATS's as thus created has been noted above and is also described in the two co-pending applications referenced above; therefore, such use will not be described in detail here. Each *Input*

10 represents an editable text entry widget, or a selection box, used by the user to specify parameters. Each wizard is a *window widget* that contains the editable input widgets described in the *Input* section and the *Objective* section of each wizard.

The wizards can be implemented in any suitable programming language that allows the creation of a user interface and the saving of information to a mass storage device such as a hard

15 drive. The elements of the user interface can include well known elements such as text boxes, drop-down lists, buttons, and the like.

Eight examples of ATS wizards will be described. Other wizards can be generated as needed for the needs of each specific type of trader.

A. Procurement Wizard (Fig. 4a)

20 **Method (403) Name:** Procurement Wizard.

Input (401): Parameters defined by the user through a graphical user interface as follows:

- A set $\{IS1, IS2, \dots, ISn\}$ of item specifications that the trader wants to procure (*to take*).
- For each item specification IS in $\{IS1, \dots, ISn\}$:
 - *Minimal-Quantity[IS]*, the minimum quantity of items to buy.
 - 25 - *Maximal-Quantity[IS]*, the maximum quantity of items to buy.

Reference-Price-Per-Unit[IS], a price to be used to construct the reference price function, used to compare offered prices.

- *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is shipped.
- 5 • *Maximal-Total-Price*, the maximum total price of the items to procure.
- *Maximal-Reference-Price-Ratio*, where *Reference-Price-Ratio* is defined as the ratio between the offered price per offered quantities and the *Reference-Price* per offered quantities, the latter computed using *Reference-Price-Per-Unit* (fair price) for each offered item specification. (Intuitively, how much more or less than the reference price is the trader
- 10 willing to pay, where for example: 2, means that the buyer is willing to pay twice as much as the reference price, and 0.5 means that the buyer is willing to pay half as much as the reference price.).
- *Objective* of the trade, which is a selection of one of the following:
 - *minimal price*, the buyer wants to pay the minimal price for any quantity of items
 - 15 *procured*.
 - *minimal price as compared with reference price*, i.e. $\min \{\text{actual price} - \text{reference price}\}$.

Default Values for Input Parameters:

The procurement method uses default values for input parameters, defined as follows:

- For each item specification *IS* in the input set $\{IS1, \dots, ISn\}$:
 - 20 - Default value for both *Minimal-Quantity[IS]* and *Maximal-Quantity[IS]* is 1 (one unit), if neither quantity was specified by the trader. If only *Minimal-Quantity[IS]* was entered by the trader, then it becomes the default value for *Maximal-Quantity[IS]*, and vice-versa.
 - The default *Maximal-Time-To-Shipping* is 0 (zero) days.
 - 25 • The default *Maximal-Total-Price* is + infinity, i.e., no limitation for price is requested.

- The default *Maximal-Reference-Price-Ratio* is $+\infty$, i.e., no limitation for *Reference-Price-Ratio* was requested.

The default *Objective* of the trade is “*minimal price*”.

Output (405):

- 5 A constructed ATS, which includes:

- *Give-Item-Entries* (the amount of money paid).
- *Take-Item-Entries* (the quantity of each item to be bought).
- *Constraints*:

- *Variables (unknowns)*.
- 10 - *Constraint Expressions*.

- *Objective* (includes objective function and indication whether minimum or maximum is sought).

Method Description:

The output ATS is constructed as follows:

- 15 • *Give-Item-Entries*:

- Set *Give-Item-Specs* to the set $\{money-IS\}$, i.e., a singleton set that contains the item specification for monetary amount.
- Set *Quantity-Range* for *money-IS* to:
- $0 \leq Quantity[money-IS] \leq Maximal-Total-Price$

- 20 • *Take-Item-Entries*:

- Set *Take-Item-Specs* to the set $\{IS1, \dots, ISn\}$ from **Input**.
- For each item specification *IS* in *Item-Specs* of *Take-Item-Entries* set its *Quantity-Range* to:
 - $Minimal-Quantity[IS] \leq Quantity[IS] \leq Maximal-Quantity[IS]$.

- 25 • *Constraints*:

- *Variables (unknowns):*

- *Quantity[IS]* for each *IS* in *Take-Item-Specs*.
- *Quantity[money-IS]*.
- *Money*.
- 5 ▪ *Reference-Price*.
- *Price*.
- *Delta*.
- *Time-To-Shipping*.

- *Constraint Expression:*

10 *Price, Delta, Money, Reference-Price, Time-To-Shipping* ≥ 0 AND

Price = Money AND

*Reference-Price = Reference-Price-Per-Unit[IS1] * Quantity[IS1] +*

... + ...

*Reference-Price-Per-Unit[ISn] * Quantity[ISn]* AND

15 *Price* \leq *Maximal-Reference-Price-Ratio* * *Reference-Price* AND

Delta = Price - Reference-Price. AND

Time-To-Shipping \leq *Maximal-Time-To-Shipping*.

• *Objective is:*

- *Minimize Price* if selected by user as *Input*.
- 20 - *Minimize Delta*, if "minimize price as compared with reference price" was selected by the user.

B. Supplier Wizard (Fig. 4b)

Method (413) Name: Supplier Wizard.

Input (411): Parameters defined by the user through a graphical user interface as follows:

- 25 • A set $\{IS1, \dots, ISn\}$ of item specifications that the trader wants to sell (*to give*).

- For each item specification IS in $\{IS_1, \dots, IS_n\}$:
 - *Minimal-Quantity[IS]*, the minimum quantity to sell.
 - *Maximal-Quantity[IS]*, the maximum quantity to sell.
 - *List-Price-Per-Unit[IS]*, the list price per unit offered.
- 5 • *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is shipped.
- *Volume-Discounted-Pricing*, described as:
 - *List-Price-Bound[1]* \rightarrow *Discount-Rate[1]*,
 - .
 - 10 - .
 - .
 - *List-Price-Bound[m]* \rightarrow *Discount-Rate[m]*. (How much in currency a buyer has to pay, to receive a certain amount of *Discount-Rate* currency.)
 - *Objective* of the trade, which has only one selection:
 - 15 - *Maximal price*, the supplier wants to receive the maximal price for items sold.

Output (415):

A constructed ATS, which includes:

- *Give-Item-Entries*.
- *Take-Item-Entries*.
- 20 • *Constraints*:
 - *Variables (unknowns)*.
 - *Constraint Expressions*.
 - *Objective* (includes objective function and indication whether minimum or maximum is sought).

25 Method Description:

The output ATS is constructed as follows:

- *Give-Item-Entries:*

- Set *Give-Item-Specs* to the set $\{IS1, \dots, ISn\}$ from **Input**.
- For each item specification *IS* in *Item-Specs* of *Give-Item-Entries* set its *Quantity-Range* to:
 - $Minimal-Quantity[IS] \leq Quantity[IS] \leq Maximal-Quantity[IS]$.

- *Take-Item-Entries:*

- Set *Take-Item-Specs* to the set $\{money-IS\}$, i.e., a singleton set that contains the item specification for monetary amount.
- Set *Quantity-Range* for *money-IS* to:
 - $0 \leq Quantity[money-IS] \leq +infinity$.

- *Constraints:*

- *Variables (unknowns):*
 - $Quantity[IS]$ for each *IS* in *Give-Item-Specs*.
 - $Quantity[money-IS]$.
 - *Price*.
 - *Time-To-Shipping*.
 - *Discount*.

- *Constraint Expression:*

$Price, List-Price, Time-To-Shipping \geq 0$ AND

$Price = Quantity[money-IS]$ AND

$List-Price =$

$List-Price-Per-Unit[IS1] * Quantity[IS1] +$

$\dots + \dots$

$List-Price-Per-Unit[ISn] * Quantity[ISn]$.

AND

/

(Discount = 0 OR

List-Price-Bound[1] ≤ List-Price < List-Price-Bound[2] AND

Discount = List-Price * Discount-Rate[1]) OR

5 ...OR...

([List-Price-Bound[m-1] ≤ List-Price < List-Price-Bound[m] AND

Discount = List-Price * Discount-Rate[m-1])

OR

([List-Price-Bound[m] ≤ List-Price AND

10 Discount = List-Price * Discount-Rate[m])

] AND

Price = List-Price - Discount. AND

Time-To-Shipping ≤ Maximal-Time-To-Shipping.

- Objective is to maximize Price.

15 C. Manufacturer Wizard (Fig. 4c)

Method (423) Name: Manufacturer Wizard.

Input (421): Parameters defined by the user through a graphical user interface as follows:

- A set {prod-IS1, ..., prod-ISn} of products item specifications that the trader manufactures from raw materials and sells.
- 20 • For each product prod-IS in {prod-IS1, ..., prod-ISn}:
 - Minimal-Quantity[prod-IS], the minimum quantity to sell.
 - Maximal-Quantity[prod-IS], the maximum quantity to sell.
 - A set {mat-IS1, ..., mat-ISn} of all raw-materials needed to produce a product prod-IS.
 - For each raw-material mat-IS in {mat-IS1, ..., mat-ISn}:

- *Quantity[prod-IS, mat-IS]*, the quantity of raw material necessary to manufacture one unit of product *prod-IS*.
- *Add-Cost[prod-IS]*, additional cost to manufacture one unit of product *prod-IS*.
- *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is shipped.
- *Profit-Margin-Scale*, described as:
 - *Revenue-Bound[1]* -> *Min-Profit-Margin[1]*,
 - .
 - .
 - .
 - *Revenue-Bound[m]* -> *Min-Profit-Margin[m]*. (Profit margin defined as $profit/cost =$ where $profit = revenue - cost$ sought for a certain revenue).
- *Profit-Margin-Scale*, described as:
 - *Revenue-Bound[1]* -> *Min-Profit-Margin[1]*,
 - .
 - .
 - *Revenue-Bound[m]* -> *Min-Profit-Margin[m]*. (Profit margin sought for a certain revenue range)
- *Objective* of the trade, which is a selection of one of the following:
 - *Maximal profit*, the trader wants to achieve maximum profit.
 - *Maximal revenue*, the trader wants to achieve maximum revenue.

Output (425):

A constructed ATS, which includes:

- *Give-Item-Entries*.

- *Take-Item-Entries.*

- *Constraints:*

- *Variables (unknowns).*

- *Constraint Expressions.*

- 5 • *Objective* (includes objective function and indication whether minimum or maximum is sought).

Method Description:

The output ATS is constructed as follows:

- *Give-Item-Entries:*

- 10 - Set *Give-Item-Specs* to the set $\{prod-IS1, ..., prod-ISn\}$ from **Input**.
- For each item specification *prod-IS* in *Item-Specs* of *Give-Item-Entries* set its *Quantity-Range* to:
- $Minimal-Quantity[prod-IS] \leq Quantity[prod-IS] \leq Maximal-Quantity[prod-IS]$.
- *give-money-IS*, the cost for all raw materials.

15 • *Take-Item-Entries:*

- Set *Take-Item-Specs* to the set $\{take-money-prod\}$, i.e., a singleton set that contains the item specification for monetary amount.
- The set $\{mat-IS1, ..., mat-ISn\}$, all raw materials needed.
- Set $Quantity[take-money-prod]$ to: $0 \leq Quantity[take-money-prod] \leq +infinity$.
- 20 - Set $Quantity[mat-IS]$ to: $0 \leq Quantity[mat-IS] \leq +infinity$, for each raw material *mat-IS* in the set $\{mat-IS1, ..., mat-ISn\}$.

- *Constraints:*

- *Variables (unknowns):*

- $Quantity[mat-IS]$.

25 ▪ $Quantity[give-money-IS]$.

- *Raw-Material-Cost.*
- *Additional-Cost.*
- *Cost.*
- *Revenue.*
- 5 ▪ *Profit.*
- *Time-To-Shipping.*

Constraint Expression:

Cost, Raw-Mat-Cost, Additional-Cost, Revenue, Profit, Time-To-Shipping ≥ 0 AND

Revenue = Quantity[money-IS] AND

10 *For all combinations that were not given as Input*

Quantity[prod-IS, mat-IS] = 0 AND

For every raw material mat-IS in {mat-IS1, ..., mat-ISn}

Quantity[mat-IS] =

*Quantity[prod-IS1, mat-IS]*Quantity[prod-IS1]+*

15 *Quantity[prod-IS2, mat-IS]*Quantity[prod-IS2]+*

...+...

*Quantity[prod-ISn, mat-IS]*Quantity[prod-ISm1.*

AND

20 *Raw-Mat-Cost = Quantity[give-money-IS].*

AND

Additional-Cost =

*Add-Cost[prod-Is1]*Quantity[prod-IS1] +*

...+...

25 *Add-Cost[prod-In1]*Quantity[prod-ISn].*

AND

$Cost = Raw-Mat-Cost + Additional-Cost.$

AND

$Revenue = Quantity[take-money-IS].$

AND

5 $Profit = Revenue - Cost.$ AND

[

$(Revenue < Revenue-Bound[1] \text{ AND}$

$Profit \geq Min-Profit-Margin[0]*Cost) \text{ AND}$

$(Revenue-Bound[1] \leq Revenue < Revenue-Bound[2] \text{ AND}$

10 $Profit \geq Min-Profit-Margin[1]*Cost)$

...OR...

$(Revenue-Bound[m-1] \leq Revenue < Revenue-Bound[m] \text{ AND}$

$Profit \geq Min-Profit-Margin[m-1]*Cost)$

OR

15 $(Revenue \leq Revenue-Bound[m] \text{ AND}$

$Profit \geq Min-Profit-Margin[m]*Cost)$

]

AND

$Time-To-Shipping \leq Maximal-Time-To-Shipping.$

20 • *Objective* is to maximize *Revenue* or *Profit*.

D. Surplus Seller Wizard (Fig. 4d)

Method (433) Name: Surplus Seller Wizard.

Input (431): Parameters defined by the user through a graphical user interface as follows:

- A set of surplus item specification $\{IS1, ..., ISn\}$ that the trader sells (*give*) for a profit.
- 25 • For each item specification *IS* in $\{IS1, ..., ISn\}$:

- *Quantity[IS]*, the quantity to sell.
- *Minimal-Price-Per-Unit[IS]*, the minimal price per unit requested by the trader.
- *Minimal-Price-Per-Purchase*, the minimal price a potential buyer is required to offer for a transaction to occur.
- 5 • *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is shipped.
- *Objective* of the trade, which has only one selection:
 - *Maximal price*, the trader wants to achieve maximum price for the whole ATS.

Output (435):

- 10 A constructed ATS, which includes:
- *Give-Item-Entries*.
 - *Take-Item-Entries*.
 - *Constraints*:
 - *Variables (unknowns)*.
 - 15 - *Constraint Expressions*.
 - *Objective* (includes objective function and indication whether minimum or maximum is sought).

Method Description:

The output ATS is constructed as follows:

- 20 • *Give-Item-Entries*:
- Set *Give-Item-Specs* to the set $\{IS_1, \dots, IS_n\}$ from **Input**.
 - For each item specification *IS* in *Item-Specs* of *Give-Item-Entries* set its *Quantity-Range* to:
 - $Minimal-Quantity[IS] \leq Quantity[IS] \leq Maximal-Quantity[IS]$.
 - 25 • *Take-Item-Entries*:

- Set *Take-Item-Specs* to the set $\{money-IS\}$, i.e., a singleton set that contains the item specification for monetary amount.
- Set *Quantity-Range* for *money-IS* to:
- $Minimal-Price-Per-Purchase \leq Quantity[money-IS] \leq +infinity$.

5 • *Constraints:*

- *Variables (unknowns):*

- $Quantity[IS]$ for each *IS* in *Give-Item-Specs*.
- $Quantity[money-IS]$.
- *Price*.

- 10 ▪ *Minimal-Price-Per-Package*. (A Package is composed of specific quantities if items that a buyer is willing to purchase.)

- *Time-To-Shipping*.

- *Constraint Expression:*

$Minimal-Price-Per-Package, Price, Time-To-Shipping \geq 0$ AND

15 $Minimal-Price-Per-Package =$

$Minimal-Price-Per-Unit[IS_1] * Quantity[IS_1] +$
 $\dots + \dots$

$Minimal-Price-Per-Unit[IS_n] * Quantity[IS_n]$.

AND

20 $Price \geq Minimal-Price-Per-Package$. AND

AND

$Price = Quantity[money-IS]$.

$Time-To-Shipping \leq Maximal-Time-To-Shipping$.

- *Objective* is to maximize *Price*.

25 E. Reseller Wizard (Fig. 4e)

Method (443) Name: Reseller Wizard.

Input (441): Parameters defined by the user through a graphical user interface as follows:

- A set $\{IS_1, \dots, IS_n\}$ of item specifications that the trader buys (*take*), then sells (*give*) for a profit.
- 5 • For each item specification IS in $\{IS_1, \dots, IS_n\}$:
 - *Minimal-Quantity[IS]*, the minimum quantity to sell.
 - *Maximal-Quantity[IS]*, the maximum quantity to sell.
 - *Cost-Price-Per-Unit[IS]*, the price paid per unit bought.
 - *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is
 - 10 shipped.
 - *Profit-Margin-Scale*, described as:
 - *Revenue-Bound[1]* \rightarrow *Min-Profit-Margin[1]*,
 - .
 - .
 - 15 - .
 - *Revenue-Bound[m]* \rightarrow *Min-Profit-Margin[m]*. (Profit margin sought for a certain revenue)
 - *Objective* of the trade, which is a selection of one of the following:
 - *Maximal profit*, the trader wants to achieve maximum profit.
 - 20 - *Maximal revenue*, the trader wants to achieve maximum revenue.

Output (445):

A constructed ATS, which includes:

- *Give-Item-Entries*.
- *Take-Item-Entries*.
- 25 • *Constraints*:

- *Variables (unknowns).*
- *Constraint Expressions.*
- *Objective* (includes objective function and indication whether minimum or maximum is sought).

5 Method Description:

The output ATS is constructed as follows:

- *Give-Item-Entries:*

- Set *Give-Item-Specs* to the set $\{IS1, \dots, ISn\}$ from **Input**.
- For each item specification *IS* in *Item-Specs* of *Give-Item-Entries* set its *Quantity-*

10 *Range* to:

- $Minimal-Quantity[IS] \leq Quantity[IS] \leq Maximal-Quantity[IS].$

- *Take-Item-Entries:*

- Set *Take-Item-Specs* to the set $\{money-IS\}$, i.e., a singleton set that contains the item specification for monetary amount.

15 - Set *Quantity-Range* for *money-IS* to:

- $0 \leq Quantity[money-IS] \leq +infinity.$

- *Constraints:*

- *Variables (unknowns):*

- $Quantity[IS]$ for each *IS* in *Give-Item-Specs*.

20 ▪ $Quantity[money-IS].$

- *Cost.*

- *Revenue.*

- *Profit.*

- *Time-To-Shipping.*

25 - *Constraint Expression:*

Cost, Revenue, Profit, Time-To-Shipping ≥ 0 AND

Revenue = *Quantity*[*money-IS*] AND

Cost =

Cost-Price-Per-Unit[*IS1*]**Quantity*[*IS1*]+

5 ... + ...

Cost-Price-Per-Unit[*ISn*]**Quantity*[*ISn*].

AND

Profit = *Revenue* – *Cost*. AND

[

10 (*Revenue* < *Revenue-Bound*[1] AND

Profit \geq *Min-Profit-Margin*[0]**Cost*) AND

(*Revenue-Bound*[1] \leq *Revenue* < *Revenue-Bound*[2] AND

Profit \geq *Min-Profit-Margin*[1]**Cost*)

...OR...

15 (*Revenue-Bound*[*m-1*] \leq *Revenue* < *Revenue-Bound*[*m*] AND

Profit \geq *Min-Profit-Margin*[*m-1*]**Cost*)

OR

(*Revenue* \leq *Revenue-Bound*[*m*] AND

Profit \geq *Min-Profit-Margin*[*m*]**Cost*)

20]

AND

Time-To-Shipping \leq *Maximal-Time-To-Shipping*.

- Objective is to maximize Revenue or Profit.

F. Simple Buy Wizard (Fig. 4f)

25 Method (453) Name: Simple Buy Wizard.

Input (451): Parameters defined by the user through a graphical user interface as follows:

- A set $\{IS1, IS2, \dots, ISn\}$ of item specifications that the trader wants to buy (*to take*).
- For each item specification IS in $\{IS1, \dots, ISn\}$:
 - *Requested-Quantity[IS]*, the quantity of items to buy.
- 5 • *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is shipped.
- *Maximal-Price*, the maximum total price of the items to procure.
- *Objective* of the trade, which has only one selection:
 - *minimal price*, the buyer wants to pay the minimal price.

10 **Output (455):**

A constructed ATS, which includes:

- *Give-Item-Entries* (the amount of money paid).
- *Take-Item-Entries* (the quantity of each item to be bought).
- *Constraints*:
 - 15 - *Variables (unknowns)*.
 - *Constraint Expressions*.
- *Objective* (includes objective function and indication whether minimum or maximum is sought).

Method Description:

20 The output ATS is constructed as follows:

- *Give-Item-Entries*:
 - Set *Give-Item-Specs* to the set $\{money-IS\}$, i.e., a singleton set that contains the item specification for monetary amount.
 - Set *Quantity-Range* for *money-IS* to:
 - 25 - $0 \leq Quantity[money-IS] \leq Maximal-Total-Price$

- *Take-Item-Entries*:

- Set *Take-Item-Specs* to the set $\{IS1, \dots, ISn\}$ from **Input**.
- For each item specification *IS* in *Item-Specs* of *Take-Item-Entries* set its *Quantity-Range* to:

5 ▪ $Requested-Quantity[IS] \leq Quantity[IS] \leq Requested-Quantity[IS]$.

- *Constraints*:

- *Variables (unknowns)*:

- $Quantity[money-IS]$.

- $Price$.

10 ▪ $Time-To-Shipping$.

- *Constraint Expression*:

$Price, Time-To-Shipping \geq 0$ AND

$Price \leq Minimal-Price$. AND

$Price = Quantity[money-IS]$.

15 $Time-To-Shipping \leq Maximal-Time-To-Shipping$.

- *Objective* is to minimize $Price$.

G. Simple Sell Wizard (Fig. 4g)

Method (463) Name: Simple Sell Wizard.

Input (461): Parameters defined by the user through a graphical user interface as follows:

- 20 • A set of item specification $\{IS1, \dots, ISn\}$ that the trader sells.
- For each item specification *IS* in $\{IS1, \dots, ISn\}$:
 - $Maximal-Quantity[IS]$, the maximal quantity available for sale.
 - $Minimal-Total-Price$, the minimal price a potential buyer is required to offer for a transaction to occur.

- *Maximal-Time-To-Shipping*, the maximal number of days until an ordered package is shipped.
- *Objective* of the trade, which has only one selection:
 - *Maximal price*, the trader wants to achieve maximum price for the whole ATS.

5 **Output (465):**

A constructed ATS, which includes:

- *Give-Item-Entries*.
- *Take-Item-Entries*.
- *Constraints*:
 - 10 - *Variables (unknowns)*.
 - *Constraint Expressions*.
- *Objective* (includes objective function and indication whether minimum or maximum is sought).

Method Description:

15 The output ATS is constructed as follows:

- *Give-Item-Entries*:
 - Set *Give-Item-Specs* to the set $\{IS1, \dots, ISn\}$ from **Input**.
 - For each item specification *sell-IS* in *Item-Specs* of *Give-Item-Entries* set its *Quantity-Range* to:
 - 20 ▪ $0 \leq \text{Quantity}[IS] \leq \text{Maximal-Quantity}[IS]$.
- *Take-Item-Entries*:
 - Set *Give-Item-Specs* to the set $\{\text{money-IS}\}$, i.e., a singleton set that contains the item specification for monetary amount.
 - Set *Quantity-Range* for *money-IS* to:
 - 25 ▪ $0 \leq \text{Quantity}[\text{money-IS}] \leq \text{Maximal-Total-Price}$

- *Constraints:*

- *Variables (unknowns):*

- *Quantity[IS]* for each *IS* in *Give-Item-Specs*.
- *Quantity[money-IS]*.
- *Price*.
- *Time-To-Shipping*.

- *Constraint Expression:*

Price, Time-To-Shipping ≥ 0 AND

Price = *Quantity[money-IS]*.

Time-To-Shipping \leq *Maximal-Time-To-Shipping*.

- *Objective* is to maximize *Price*.

H. Trade In Wizard (Fig. 4h)

Method (473) Name: Trade In Wizard.

15 **Input (471):** Parameters defined by the user through a graphical user interface as follows:

- A set of item specification $\{buy-IS1, \dots, buy-ISn\}$ that the trader buys.
- For each item specification *buy-IS* in $\{buy-IS1, \dots, buy-ISn\}$:
 - *Requested-Quantity[buy-IS]*, the requested quantity to buy.
- A set of item specification $\{sell-IS1, \dots, sell-ISn\}$ that the trader sells
- 20 • For each item specification *sell-IS* in $\{sell-IS1, \dots, sell-ISn\}$:
 - *Offered-Quantity[buy-IS]*, the requested quantity to sell.
- *Minimal-Money-Received*. The minimal amount of money the trade wants to get, in order to perform a transaction.
- *Maximal-Money-Spent*. The maximal amount of money the trade wants to spend, in order to
- 25 perform a transaction.

- *Objective* of the trade, which has only one selection:
 - *Maximal Money-Balance*, the trader wants to achieve maximum balance (*money-received* – *money-spent*) for the whole ATS.

Output (475):

- 5 A constructed ATS, which includes:
- *Give-Item-Entries*.
 - *Take-Item-Entries*.
 - *Constraints*:
 - *Variables (unknowns)*.
 - 10 - *Constraint Expressions*.
 - *Objective* (includes objective function and indication whether minimum or maximum is sought).

Method Description:

The output ATS is constructed as follows:

- 15 • *Give-Item-Entries*:
- Set *Give-Item-Specs* to the set $\{sell-IS1, \dots, sell-ISn\}$ from **Input**.
 - For each item specification *sell-IS* in *Item-Specs* of *Give-Item-Entries* set its *Quantity-Range* to:
 - $Offered-Quantity[sell-IS] \leq Quantity[sell-IS] \leq Offered-Quantity[sell-IS]$.
 - 20 • $0 \leq Quantity[give-money-IS] \leq Maixmal-Money-Spent$.
 - *Take-Item-Entries*:
 - Set *Take-Item-Specs* to the set $\{buy-IS1, \dots, buy-ISn\}$ from **Input**.
 - For each item specification *buy-IS* in *Item-Specs* of *Take-Item-Entries* set its *Quantity-Range* to:
 - 25 ▪ $Requested-Quantity[buy-IS] \leq Quantity[buy-IS] \leq Requested-Quantity[buy-IS]$.

- *Minimal-Money-Received* \leq *Quantity[take-money-IS]* \leq $+\infty$.
 - *Constraints:*
 - *Variables (unknowns):*
 - *Quantity[IS]* for each *IS* in *Give-Item-Specs*.
 - 5 ▪ *Quantity[money-IS]*.
 - *Price*.
 - *Time-To-Shipping*.
 - *Constraint Expression:*

Money-Received , *Money-Spent* , *Money-Balance*, *Time-To-Shipping* \geq 0 AND

10 *Money-Received* = *Quantity[take-money-IS]* AND

Money-Spent = *Quantity[give-money-IS]* AND

Money-Balance = *Money-Received* – *Money-Spent*. AND

Time-To-Shipping \leq *Maximal-Time-To-Shipping*.
 - *Objective* is to maximize *Money-Balance*.
- 15 The methods of Figs. 4a-4h will now be summarized with reference to Fig. 5. In step 501, the Web server 205 presents the trader with a user interface by sending the appropriate HTML code or other information to the trader's computer or other device 209. The trader inputs the information requested, and in step 503, the Web server 205 receives that information. In step 505, the specifications and quantity range of the give-items are determined. In step 507, the
- 20 specifications and quantity range of the take-items are determined. In step 509, the constraints are determined. In step 511, the objective is determined. The result is a completed ATS in step 513.

The wizards and the ATS can be stored anywhere on the system of Fig. 2. Typically, the wizards are stored on the Web server 205, since the trader interacts with them, while the

25 completed ATS is stored on the database server 201. Also, the code for implementing the

wizards can be written on the system of Fig. 2 or written elsewhere and supplied on any suitable computer-readable medium, such as a CD-ROM.

While a preferred embodiment of the present invention has been set forth in detail above, those skilled in the art who have reviewed the present disclosure will readily appreciate that other
5 embodiments can be realized within the scope of the present invention. For example, disclosures of certain hardware, operating systems, and other software are illustrative rather than limiting, as are specific numerical values. Also, while a graphical user interface has been taught, a text-based interface could be used instead. Therefore, the present invention should be construed as limited only by the appended claims.

We claim:

1. A method for forming an adaptive trade specification for use in an electronic marketplace used by a plurality of traders, the adaptive trade specification being a mathematical representation, for one of the plurality of traders, of:

- 5 (i) at least one give-item entry identifying at least one item that said one of the traders is willing to give in an exchange;
- (ii) at least one take-item entry identifying at least one item that said one of the traders wants in return for the at least one item identified in the give-item entry;
- 10 (iii) at least one constraint entry identifying at least one constraint that said one of the traders has placed on the exchange; and
- (iv) an objective entry identifying an objective sought by said one of the traders in the exchange;

the method comprising:

- 15 (a) providing to said one of the traders a user interface in which said one of the traders inputs information concerning the exchange;
- (b) receiving the information input by said one of the traders into the graphical user interface;
- (c) from the information input by said one of the traders, determining give-item
20 specifications and a give-item quantity range of the at least one item that said one of the traders is willing to give in an exchange and storing said give-item specifications and said give-item quantity range in the at least one give-item entry;
- (d) from the information input by said at least one of the traders, determining
25 take-item specifications and a take-item quantity range of the at least one item that said one of the traders wants in return for the at least one item identified

in the give-item entry and storing said take-item specifications and said take-item quantity range in the take-item entry;

(e) from the information input by said at least one of the traders, determining and storing the at least one constraint entry; and

5 (f) from the information input by said at least one of the traders, determining and storing the objective entry.

2. The method of claim 1, wherein the exchange is a procurement of at least one item by said one of the traders, and wherein the information comprises a set of item specifications for the at least one item and minimum and maximum quantities of said at least one item to be procured.

10 3. The method of claim 2, wherein the information further comprises information concerning a reference price for the at least one item.

4. The method of claim 3, wherein the information further comprises a selection by said at least one of the traders of whether the objective is a minimization of a total cost of the exchange or a minimization of a cost of the exchange relative to the reference price.

15 5. The method of claim 2, wherein the information further comprises a maximal time to shipping of the at least one item.

6. The method of claim 2, wherein the information further comprises a maximal total price of the at least one item.

20 7. The method of claim 1, wherein the exchange is a sale of at least one item by said one of the traders, and wherein the information comprises a set of item specifications for the at least one item and minimum and maximum quantities of said at least one item to be sold.

25 8. The method of claim 7, wherein the objective is a maximal price for the at least one item to be sold.

9. The method of claim 7, wherein the information further comprises a list price for the at least one item.

10. The method of claim 9, wherein the information further comprises a volume discounted price for the at least one item.

5 11. The method of claim 7, wherein the information comprises a maximal time to shipping for the at least one item.

12. The method of claim 1, wherein said one of the traders is a manufacturer, and wherein the information comprises a set of specifications of items that the manufacturer makes.

10 13. The method of claim 12, wherein the information further comprises, for each of the items that the manufacturer makes, a minimum quantity to sell and a maximum quantity to sell.

14. The method of claim 12, wherein the information further comprises, for each of the items that the manufacturer makes, a set of raw materials that the manufacturer requires.

15 15. The method of claim 14, wherein the information further comprises, for each of the items that the manufacturer makes, a required quantity of each of the raw materials.

16. The method of claim 15, wherein the information further comprises, for each of the items that the manufacturer makes, an additional manufacturing cost per item from the raw materials.

20 17. The method of claim 12, wherein the information further comprises, for each of the items that the manufacturer makes, a maximal time to shipping.

18. The method of claim 12, wherein the information further comprises a profit margin scale.

25 19. The method of claim 12, wherein the information further comprises a selection by the manufacturer of whether the objective is maximum profit or maximum revenue.

20. The method of claim 1, wherein said one of the traders is a surplus seller, and wherein the information comprises a set of specifications of surplus items that the surplus seller sells.

21. The method of claim 20, wherein the information further comprises, for each of the surplus items, a minimal price per unit.

22. The method of claim 21, wherein the information further comprises a minimal price per purchase.

23. The method of claim 20, wherein the information further comprises a maximal time to shipping.

24. The method of claim 20, wherein the objective is a maximal price for the entire adaptive trade specification.

25. The method of claim 1, wherein said one of the traders is a reseller, and wherein the information comprises a set of specifications of items that the reseller buys and resells.

26. The method of claim 25, wherein the information further comprises, for each of the items that the reseller buys and resells, a minimal quantity to sell, a maximal quantity to sell, and a cost that the reseller pays per unit.

27. The method of claim 25, wherein the information further comprises a maximal time to shipping.

28. The method of claim 25, wherein the information further comprises, for each of the items that the manufacturer buys and resells, a profit margin scale.

29. The method of claim 25, wherein the information further comprises an indication by the reseller of whether the objective is maximal profit or maximal revenue.

30. The method of claim 1, wherein said one of the traders is a buyer, and wherein the information comprises a set of specifications of items that the buyer wants to buy.

31. The method of claim 30, wherein the information further comprises, for each of the items that the buyer wants to buy, a requested quantity.

32. The method of claim 30, wherein the information further comprises, for each of the items that the buyer wants to buy, a maximal time to shipping.

33. The method of claim 30, wherein the information further comprises a maximal price for all of the items that the buyer wants to buy.

5 34. The method of claim 30, wherein the objective is a minimal price for all of the items that the buyer wants to buy.

35. The method of claim 1, wherein said one of the traders is a seller, and wherein the information comprises a set of specifications of items that the seller wants to sell.

10 36. The method of claim 35, wherein the information further comprises, for each of the items that the seller wants to sell, a maximal quantity available for sale.

37. The method of claim 35, wherein the information further comprises a minimal total price that a potential buyer is required to offer.

38. The method of claim 35, wherein the information further comprises a maximal time to shipping.

15 39. The method of claim 35, wherein the objective is a maximal price for the entire adaptive trade specification.

20 40. The method of claim 1, wherein said one of the traders is a trade-in trader who both buys and sells, and wherein the information comprises a first set of specifications of items that the trade-in trader buys and a second set of specifications of items that the trader sells.

41. The method of claim 40, wherein the information further comprises a requested quantity of each of the items that the trade-in trader buys.

42. The method of claim 40, wherein the information further comprises an offered quantity of each of the items that the trade-in trader sells.

25 43. The method of claim 40, wherein the information further comprises a minimum amount of money that the trade-in trader wants to receive to perform the exchange.

44. The method of claim 40, wherein the information further comprises a maximum amount of money that the trade-in trader wants to spend to perform a transaction.

45. The method of claim 40, wherein the objective is a maximum of a difference between money received and money spent for an entirety of the adaptive trade specification.

5 46. The method of claim 1, wherein step (a) comprises providing a default value for at least a portion of the information.

47. A system for forming an adaptive trade specification for use in an electronic marketplace used by a plurality of traders, the adaptive trade specification being a mathematical representation, for one of the plurality of traders, of:

- 10 (i) at least one give-item entry identifying at least one item that said one of the traders is willing to give in an exchange;
- (ii) at least one take-item entry identifying at least one item that said one of the traders wants in return for the at least one item identified in the give-item entry;
- 15 (iii) at least one constraint entry identifying at least one constraint that said one of the traders has placed on the exchange; and
- (iv) an objective entry identifying an objective sought by said one of the traders in the exchange;

the system comprising:

20 interface means for providing to said one of the traders a user interface in which said one of the traders inputs information concerning the exchange and for receiving the information input by said one of the traders into the graphical user interface; and

database means for (i) determining, from the information input by said one of the traders, give-item specifications and a give-item quantity range of the at least one item that said one of
25 the traders is willing to give in an exchange and storing said give-item specifications and said give-item quantity range in the at least one give-item entry, (ii) determining, from the

information input by said at least one of the traders, take-item specifications and a take-item quantity range of the at least one item that said one of the traders wants in return for the at least one item identified in the give-item entry and storing said take-item specifications and said take-item quantity range in the take-item entry, (iii) from the information input by said at least one
5 of the traders, determining and storing the at least one constraint entry, and (iv) from the information input by said at least one of the traders, determining and storing the objective entry.

48. An article of manufacture for forming an adaptive trade specification for use in an electronic marketplace used by a plurality of traders, the adaptive trade specification being a mathematical representation, for one of the plurality of traders, of:

- 10 (i) at least one give-item entry identifying at least one item that said one of the traders is willing to give in an exchange;
- (ii) at least one take-item entry identifying at least one item that said one of the traders wants in return for the at least one item identified in the give-item entry;
- 15 (iii) at least one constraint entry identifying at least one constraint that said one of the traders has placed on the exchange; and
- (iv) an objective entry identifying an objective sought by said one of the traders in the exchange;

the article of manufacture comprising:

- 20 a computer-readable storage medium; and
- code on the computer-readable storage medium for being executed on a computer to control the computer for:

- (a) providing to said one of the traders a user interface in which said one of the traders inputs information concerning the exchange;
- 25 (b) receiving the information input by said one of the traders into the graphical user interface;

- (c) from the information input by said one of the traders, determining give-item specifications and a give-item quantity range of the at least one item that said one of the traders is willing to give in an exchange and storing said give-item specifications and said give-item quantity range in the at least one give-item entry;
- 5 (d) from the information input by said at least one of the traders, determining take-item specifications and a take-item quantity range of the at least one item that said one of the traders wants in return for the at least one item identified in the give-item entry and storing said take-item specifications and said take-item quantity range in the take-item entry;
- 10 (e) from the information input by said at least one of the traders, determining and storing the at least one constraint entry; and
- (f) from the information input by said at least one of the traders, determining and storing the objective entry.

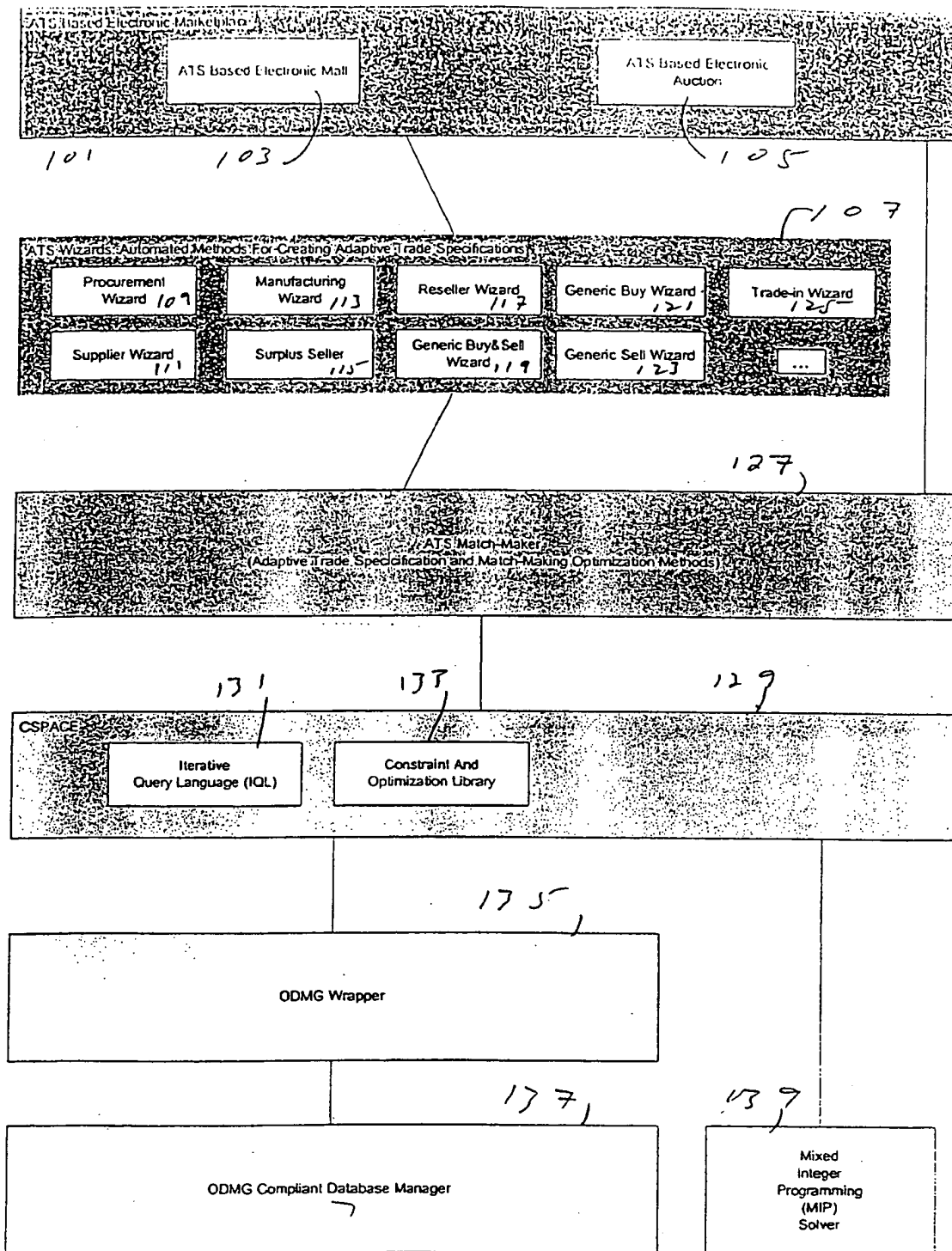


Fig. 1

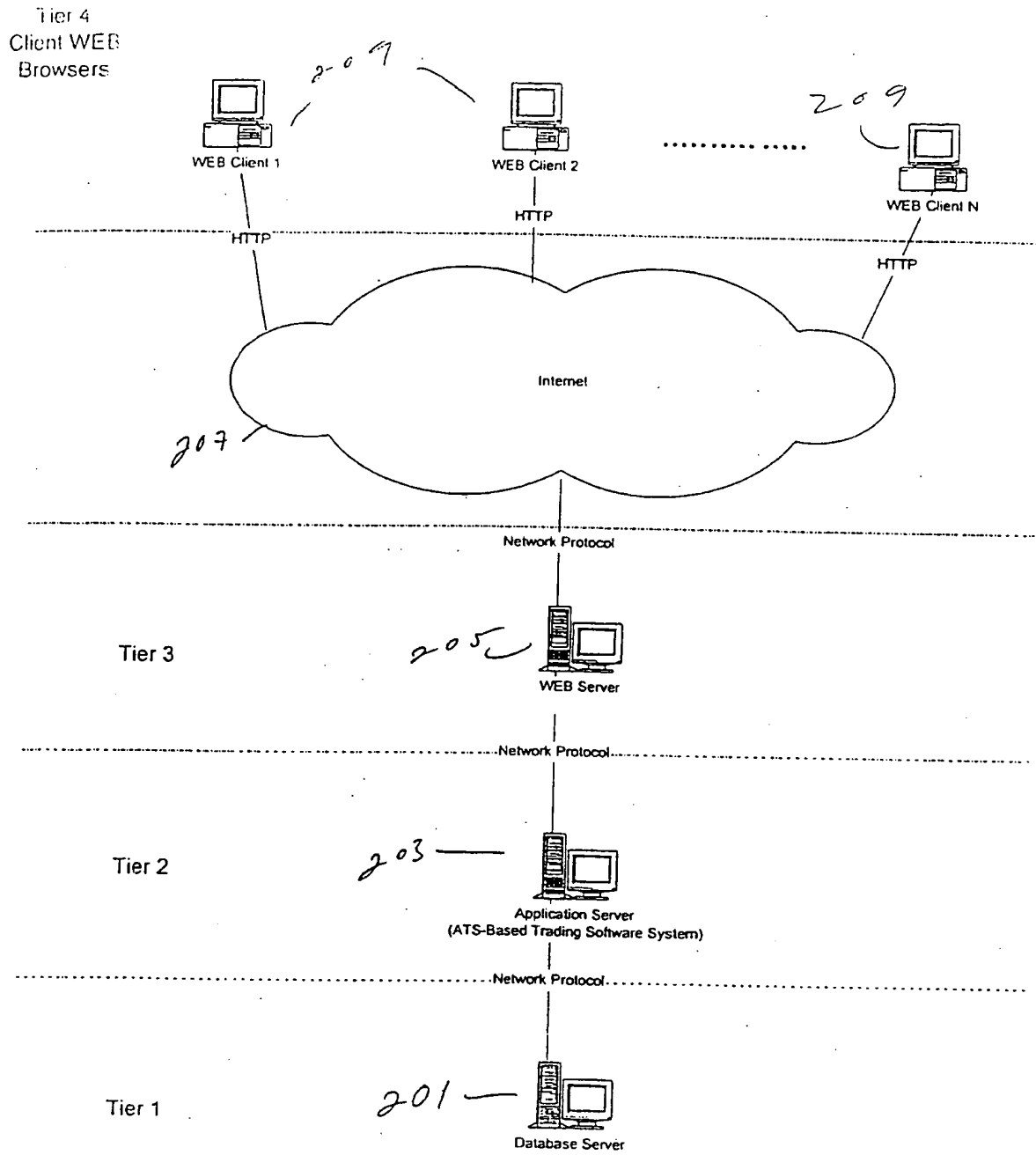


FIG. 2

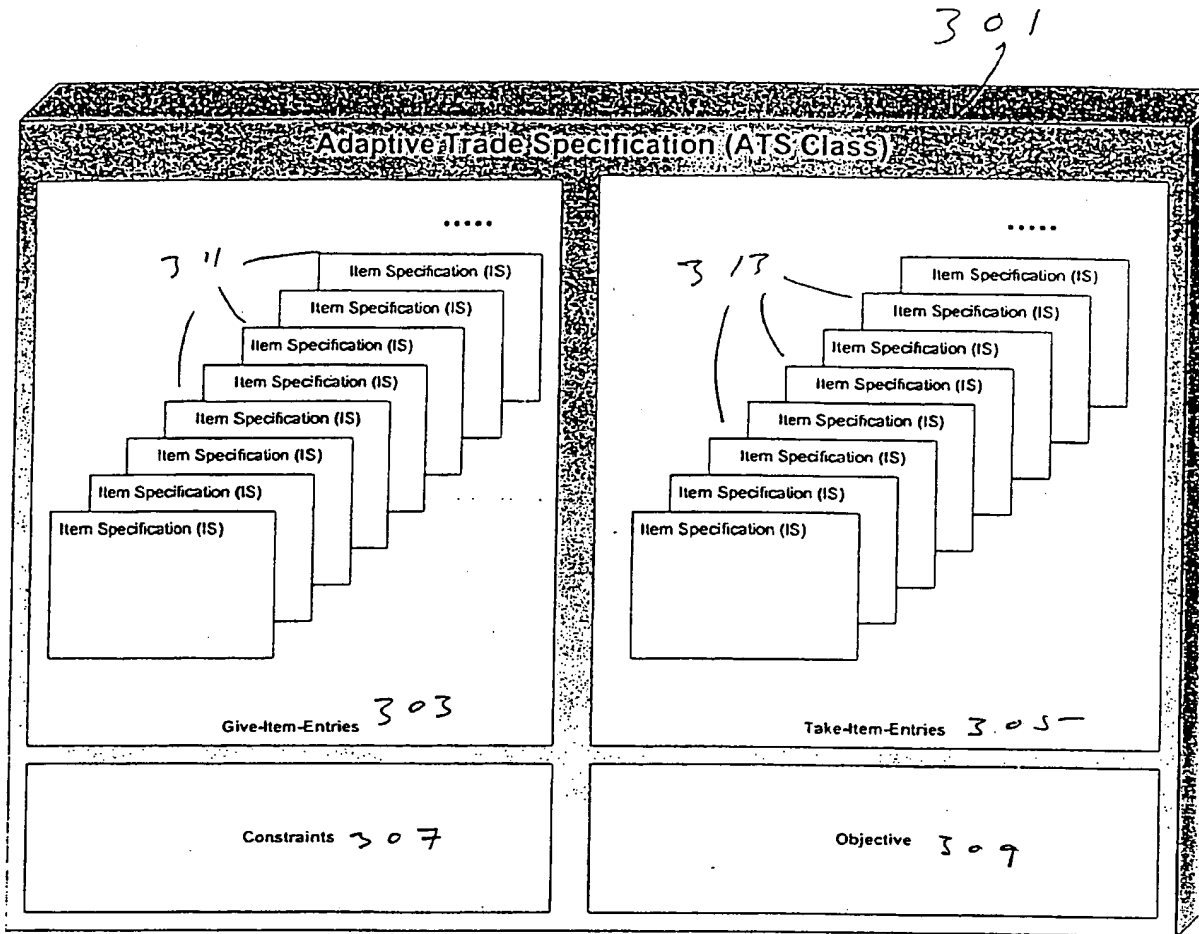
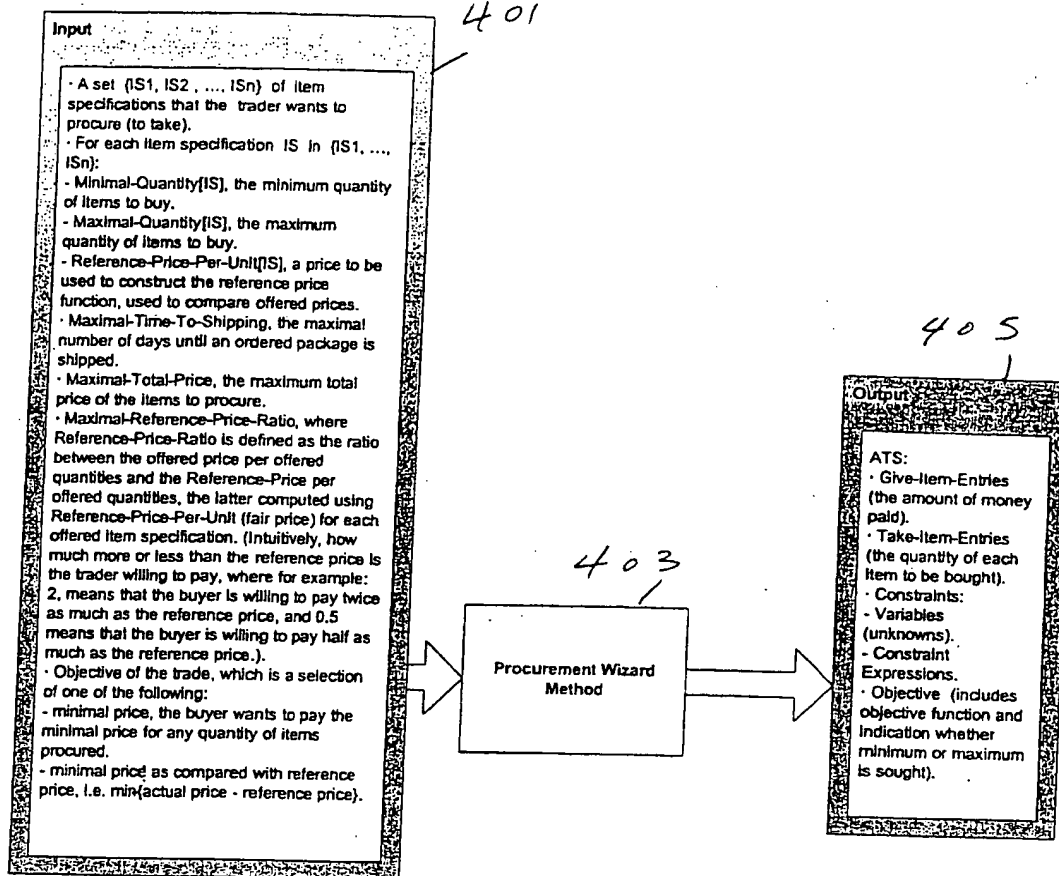
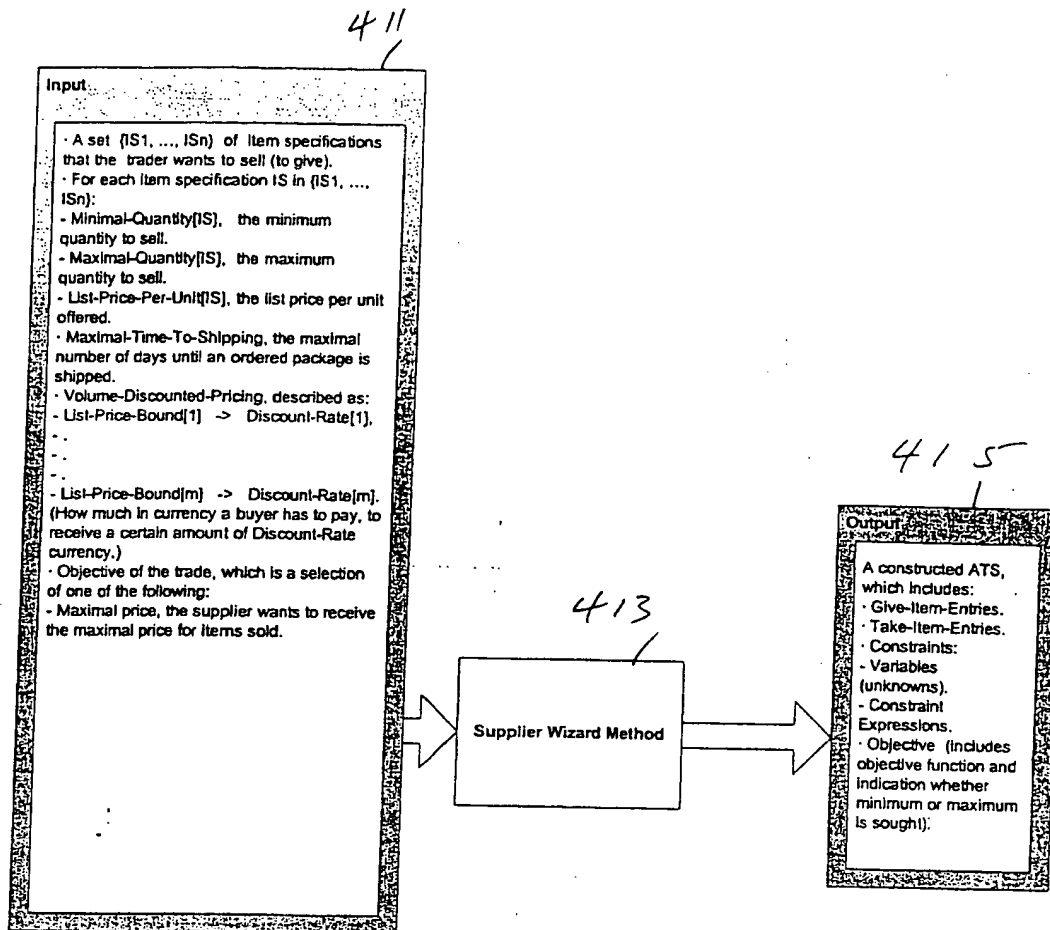
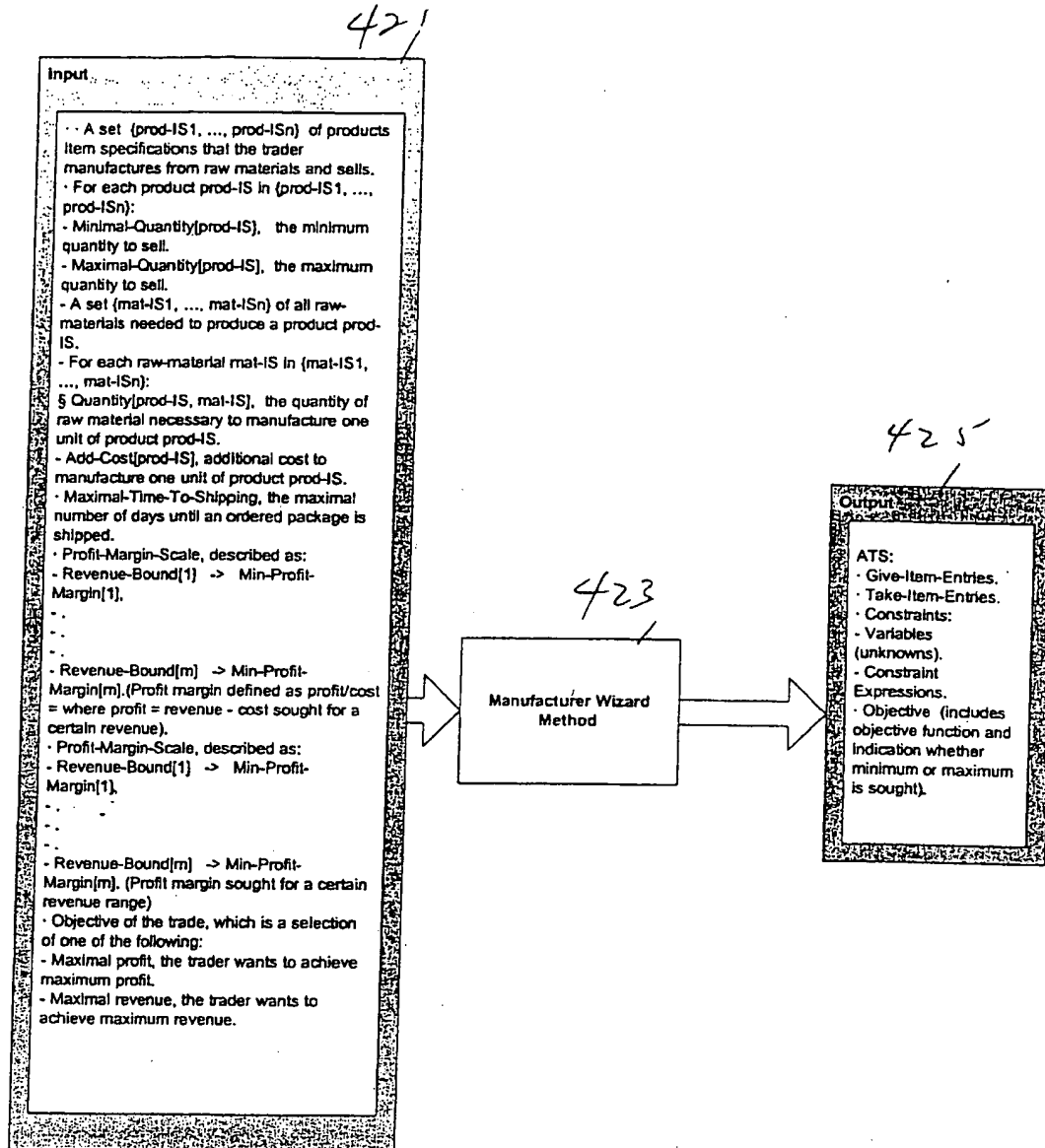
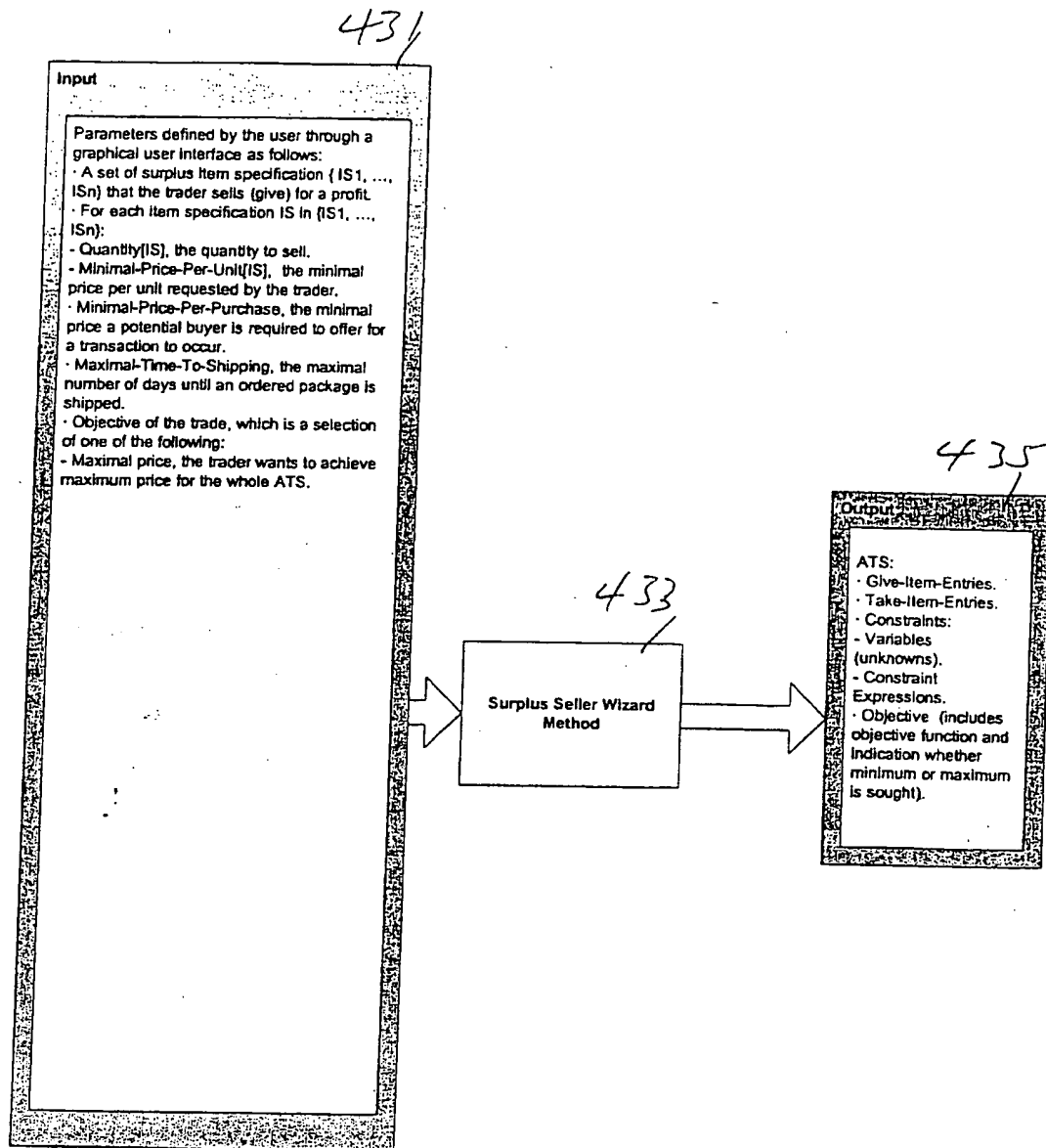


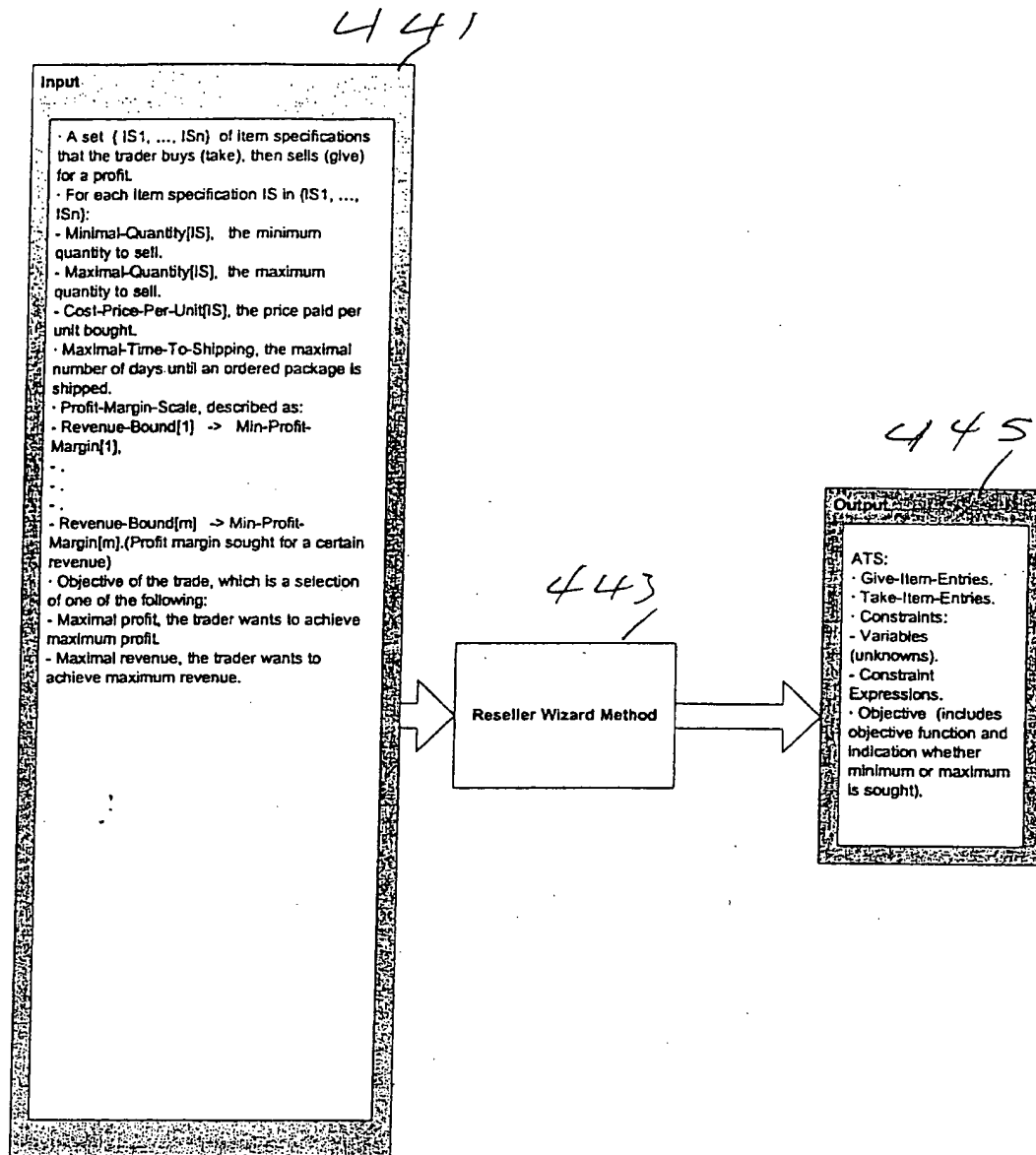
FIG. 3

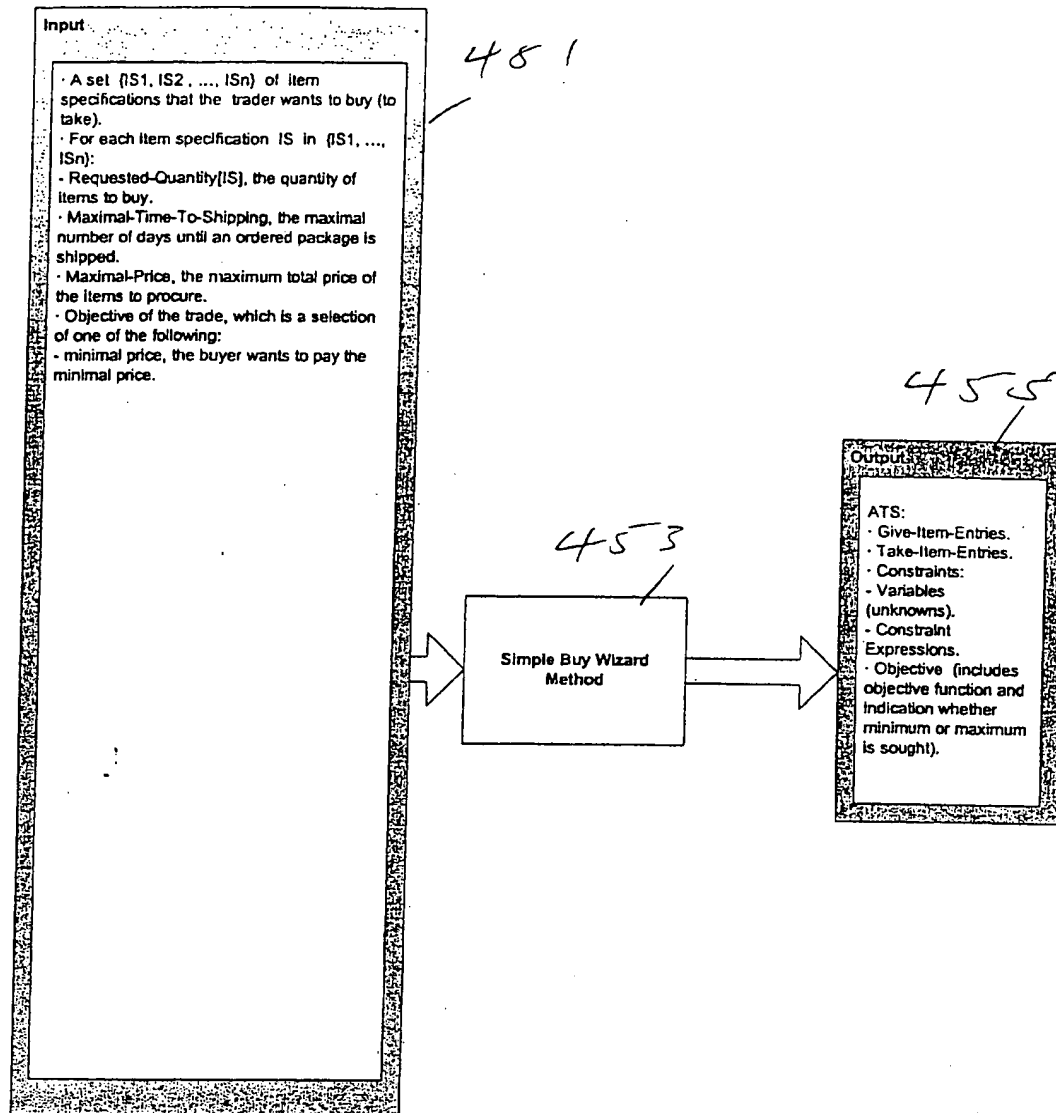


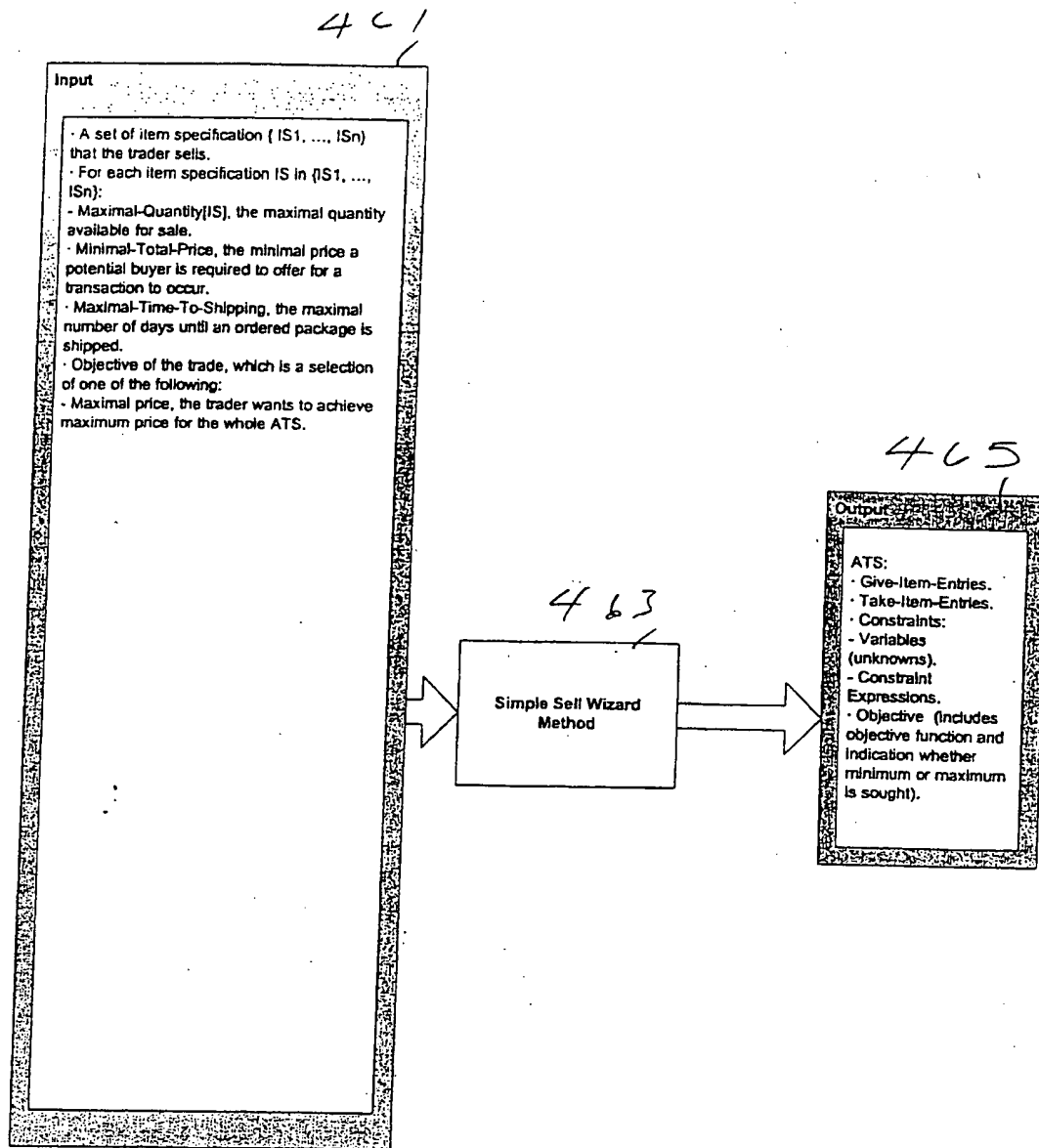












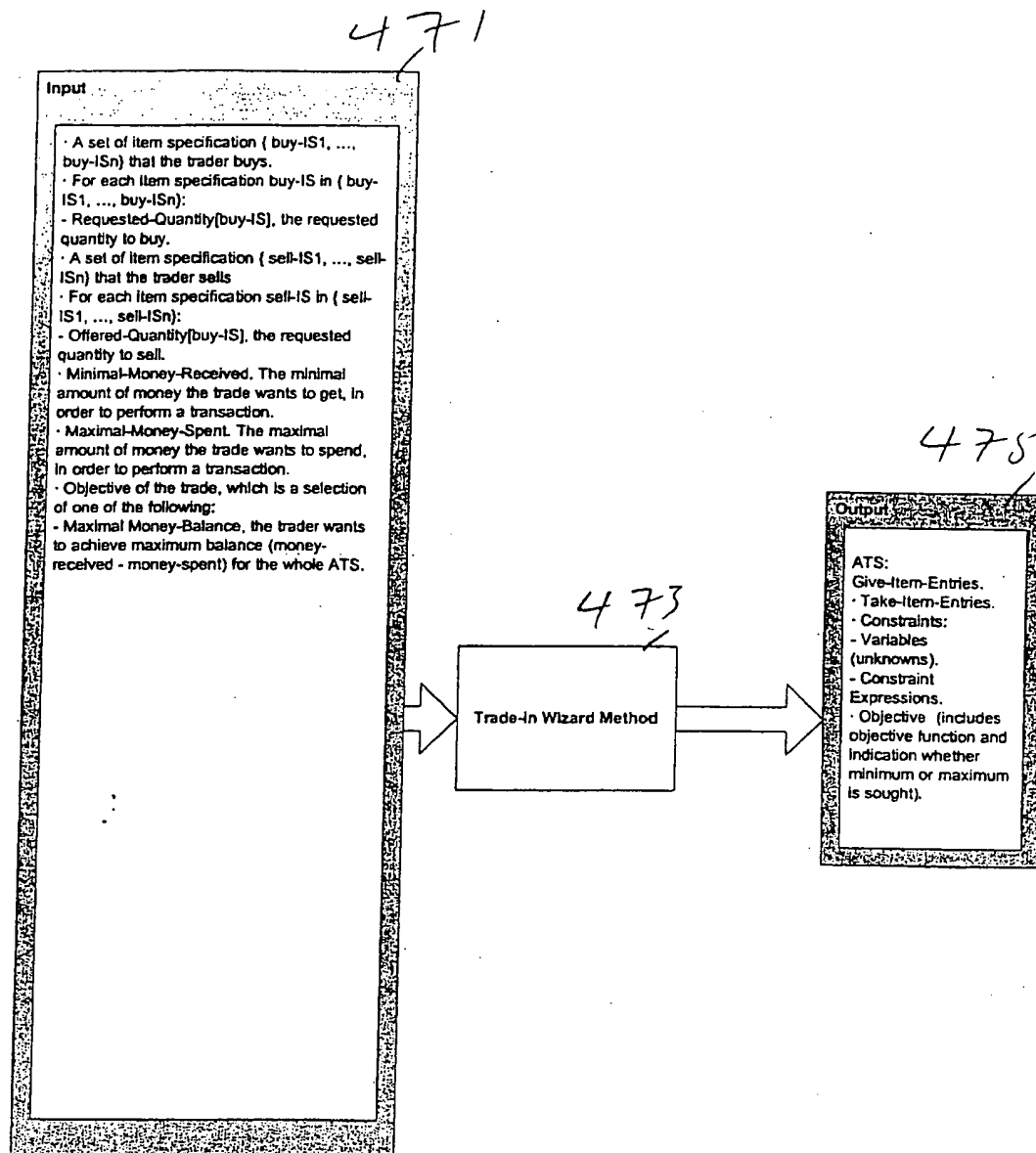
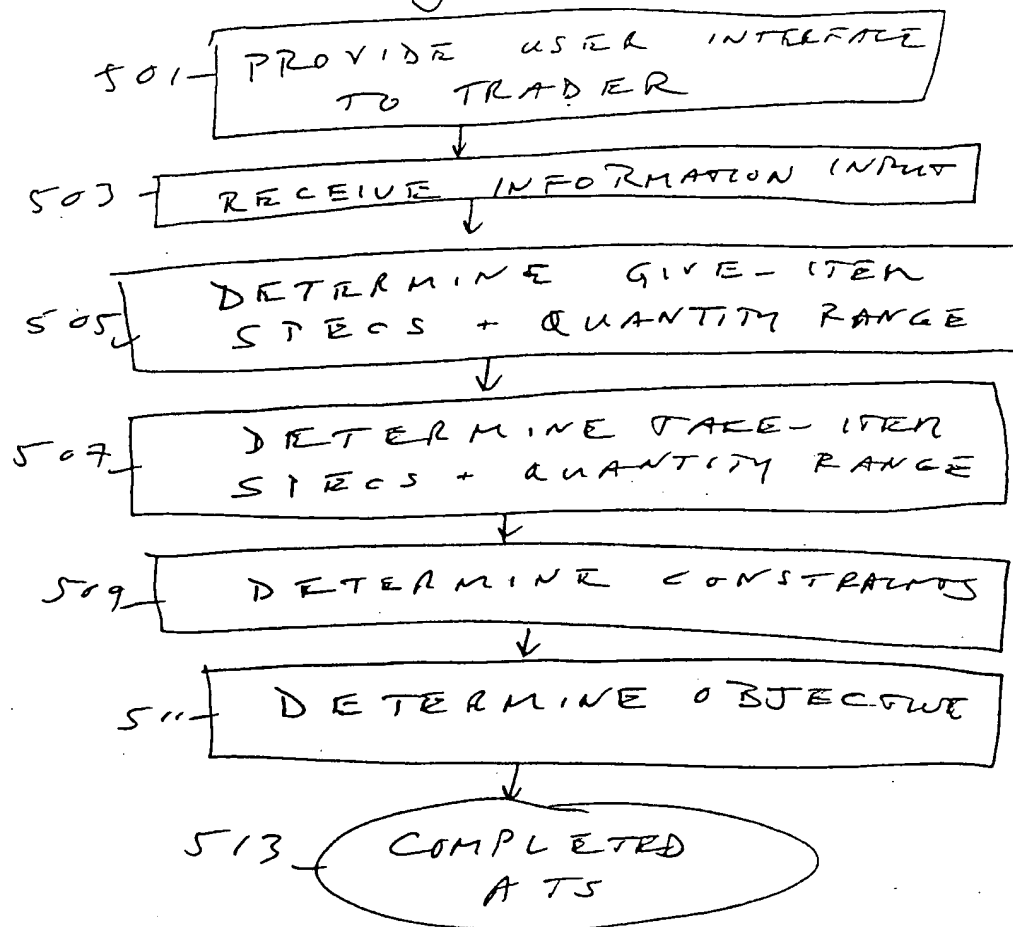


Fig. 5



PATENT COOPERATION TREATY

PCT

DECLARATION OF NON-ESTABLISHMENT OF INTERNATIONAL SEARCH REPORT

(PCT Article 17(2)(a), Rules 13ter.1(c) and Rule 39)

| | | |
|---|--|---|
| Applicant's or agent's file reference 110422.0109 | IMPORTANT DECLARATION | Date of mailing(day/month/year) 27/12/2001 |
| International application No. PCT/US 00/ 30321 | International filing date(day/month/year) 03/11/2000 | (Earliest) Priority date(day/month/year) 03/11/1999 |
| International Patent Classification (IPC) or both national classification and IPC G06F17/60 | | |
| Applicant ADAPTIVE TRADE, INC. | | |

This International Searching Authority hereby declares, according to Article 17(2)(a), that **no international search report will be established on the international application for the reasons indicated below**

1. ☐ The subject matter of the international application relates to:
 - a. ☐ scientific theories.
 - b. ☐ mathematical theories
 - c. ☐ plant varieties.
 - d. ☐ animal varieties.
 - e. ☐ essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes.
 - f. ☒ schemes, rules or methods of doing business.
 - g. ☐ schemes, rules or methods of performing purely mental acts.
 - h. ☐ schemes, rules or methods of playing games.
 - i. ☐ methods for treatment of the human body by surgery or therapy.
 - j. ☐ methods for treatment of the animal body by surgery or therapy.
 - k. ☐ diagnostic methods practised on the human or animal body.
 - l. ☐ mere presentations of information.
 - m. ☐ computer programs for which this International Searching Authority is not equipped to search prior art.

2. ☐ The failure of the following parts of the international application to comply with prescribed requirements prevents a meaningful search from being carried out:


☐ the description
☐ the claims
☐ the drawings

3. ☐ The failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions prevents a meaningful search from being carried out:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

4. Further comments:

| | |
|--|--|
| Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016 | Authorized officer Lucia Van Pinxteren |
|--|--|

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 203

The claims relate to subject matter for which no search is required according to Rule 39 PCT. Given that the claims are formulated in terms of such subject matter or merely specify commonplace features relating to its technological implementation, the search examiner could not establish any technical problem which might potentially have required an inventive step to overcome. Hence it was not possible to carry out a meaningful search into the state of the art (Art. 17(2)(a)(i) and (ii) PCT; see Guidelines Part B Chapter VIII, 1-6).

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.

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